

Claims

What is claimed is:

1 1. A method for implementing deterministic based broken scan
2 chain diagnostics comprising the steps of:
3 generating a deterministic test pattern;
4 loading the deterministic test pattern into each scan chain in a device
5 under test using lateral insertion via system data ports and applying system
6 clocks;
7 unloading each scan chain and identifying a last switching latch in
8 each scan chain;
9 repeating the generating, loading, and unloading testing steps a
10 selected number of times; and
11 checking for consistent results; and responsive to consistent results
12 being identified, sending the identified last switching latch to a Physical
13 Failure Analysis system.

1 2. A method for implementing deterministic based broken scan
2 chain diagnostics as recited in claim 1 further includes the steps responsive
3 to consistent results not being identified, of selecting another deterministic
4 test pattern; and repeating the testing steps a selected number of times.

1 3. A method for implementing deterministic based broken scan
2 chain diagnostics as recited in claim 1 wherein the step of generating a
3 deterministic test pattern includes the steps of using a base deterministic
4 test pattern set generated by an Automatic Test Pattern Generation (ATPG)
5 system.

1 4. A method for implementing deterministic based broken scan
2 chain diagnostics as recited in claim 1 wherein the step of generating a
3 deterministic test pattern includes the steps of using perturbations of one
4 base deterministic test pattern from a base deterministic test pattern set
5 generated by an Automatic Test Pattern Generation (ATPG) system.

1 5. A method for implementing deterministic based broken scan
2 chain diagnostics as recited in claim 4 wherein the step of using
3 perturbations of one base deterministic test pattern includes the steps of
4 applying said one base deterministic test pattern from the base deterministic
5 test pattern set to an exclusive OR and multiplexing a selected perturbation
6 matrix entry using said exclusive OR.

1 6. A method for implementing deterministic based broken scan
2 chain diagnostics as recited in claim 5 includes the steps of providing a
3 perturbation matrix with a plurality of perturbation matrix entries including
4 selected ones of no invert, all invert, a predefined bit invert; rotate, and invert
5 rotate.

1 7. A method for implementing deterministic based broken scan
2 chain diagnostics as recited in claim 1 wherein the step of generating a
3 deterministic test pattern includes the steps of using a software Pseudo
4 Random Pattern Generator (PRPG).

1 8. A method for implementing deterministic based broken scan
2 chain diagnostics as recited in claim 1 wherein the step of generating a
3 deterministic test pattern includes the steps of using a set of deterministic
4 test patterns resident in a memory.

1 9. A method for implementing deterministic based broken scan
2 chain diagnostics as recited in claim 1 wherein the step of loading the
3 deterministic test pattern into each scan chain in the device under test using
4 lateral insertion via system data ports and applying system clocks includes
5 the steps of applying deterministic values of the deterministic test pattern to
6 selected one of scan chain inputs and primary inputs.

1 10. A method for implementing deterministic based broken scan
2 chain diagnostics as recited in claim 1 wherein the step of loading the
3 deterministic test pattern into each scan chain in the device under test using
4 lateral insertion via system data ports and applying system clocks includes
5 the steps of applying perturbation deterministic values of the deterministic
6 test pattern to selected one of scan chain inputs and primary inputs.

1 11. A method for implementing deterministic based broken scan
2 chain diagnostics as recited in claim 1 wherein the step of loading the
3 deterministic test pattern into each scan chain in the device under test using
4 lateral insertion via system data ports and applying system clocks includes
5 the steps of applying random data from a software Pseudo Random Pattern
6 Generator (PRPG) to scan chain inputs and primary inputs.

1 12. A method for implementing deterministic based broken scan
2 chain diagnostics as recited in claim 1 wherein the step of loading the
3 deterministic test pattern into each scan chain in the device under test using
4 lateral insertion via system data ports and applying system clocks includes
5 the steps of applying output values from an exclusive OR receiving one base
6 deterministic test pattern from a base deterministic test pattern set and a
7 selected perturbation matrix entry.

1 13. Apparatus for implementing deterministic based broken scan
2 chain diagnostics comprising:
3 a set of deterministic test patterns;
4 a test control program for loading a deterministic test pattern into
5 each scan chain in the device under test using lateral insertion via system
6 data ports and applying system clocks; unloading each scan chain and
7 identifying a last switching latch in each scan chain; repeating the
8 generating, loading, and unloading testing steps a selected number of times;
9 and checking for consistent results and responsive to consistent results
10 being identified, sending the identified last switching latch to a Physical
11 Failure Analysis system.

1 14. Apparatus for implementing deterministic based broken scan
2 chain diagnostics as recited in claim 13 wherein said set of deterministic test
3 patterns includes a base deterministic test pattern set generated by an
4 Automatic Test Pattern Generation (ATPG) system.

1 15. Apparatus for implementing deterministic based broken scan
2 chain diagnostics as recited in claim 13 wherein said set of deterministic test
3 patterns includes perturbations of one base deterministic test pattern from a
4 base deterministic test pattern set generated by an Automatic Test Pattern
5 Generation (ATPG) system.

1 16. Apparatus for implementing deterministic based broken scan
2 chain diagnostics as recited in claim 15 wherein said perturbations of one
3 base deterministic test pattern is generated by applying said one base
4 deterministic test pattern from the base deterministic test pattern set to an
5 exclusive OR and multiplexing a selected perturbation matrix entry using
6 said exclusive OR.

1 17. Apparatus for implementing deterministic based broken scan
2 chain diagnostics as recited in claim 16 includes a perturbation matrix having
3 a plurality of perturbation matrix entries including selected ones of no invert,
4 all invert, a predefined bit invert; rotate, and invert rotate.

1 18. Apparatus for implementing deterministic based broken scan
2 chain diagnostics as recited in claim 13 wherein said set of deterministic test
3 patterns includes a software Pseudo Random Pattern Generator (PRPG) for
4 generating a deterministic test pattern.

1 19. A computer program product for implementing deterministic
2 based broken scan chain diagnostics of a device under test in a computer
3 test system, said computer program product including instructions executed
4 by the computer test system to cause the computer system to perform the
5 steps of:
6 generating a deterministic test pattern;
7 loading the deterministic test pattern into each scan chain in the
8 device under test using lateral insertion via system data ports and applying
9 system clocks;
10 unloading each scan chain and identifying a last switching latch in
11 each scan chain;
12 repeating the generating, loading, and unloading testing steps a
13 selected number of times; and
14 checking for consistent results; and responsive to consistent results
15 being identified, sending the identified last switching latch to a Physical
16 Failure Analysis system.

- 1 20. A computer program product for implementing deterministic
- 2 based broken scan chain diagnostics as recited in claim 19 includes the
- 3 steps responsive to consistent results not being identified, of selecting
- 4 another deterministic test pattern; and repeating the testing steps a selected
- 5 number of times.